

**MIDE Technology**

**Corporeal Bus: A Plug & Play  
Physiological Platform**

**SMART-ePANTS Lightning Talk**

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# Problem: Inventing complete systems is hard!

- ▶ Why are we still talking about \_\_\_\_\_ instead of wearing it?
  - WPSM, haptic cueing, dosimetry, actuation, energy harvesting
- ▶ Big-picture problem: need to be an expert in everything!
  - Sensors & Actuators
  - Electronics
  - Textile Engineering
  - Wireless Protocols
  - Fashion Design
  - Garment Manufacturing
  - Data Processing & Visualization
  - Cloud Backend?
- ▶ Novel technologies cannot “escape the lab”
- ▶ Need a modular approach

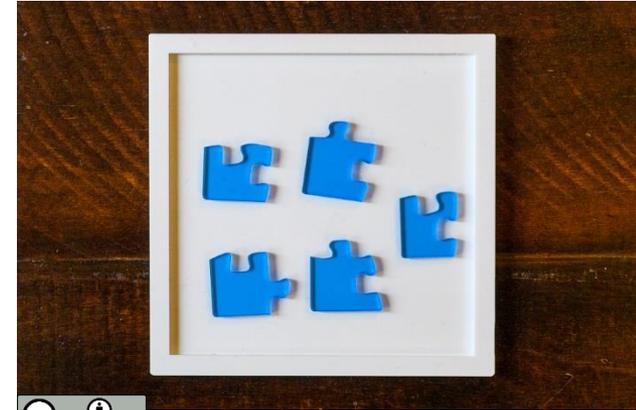
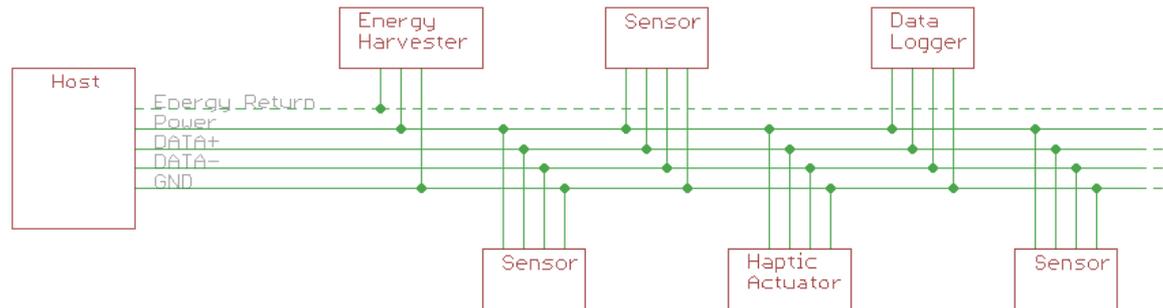


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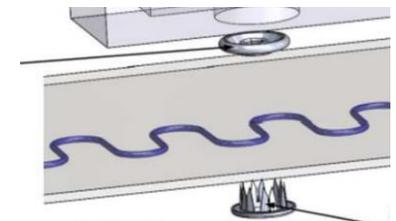
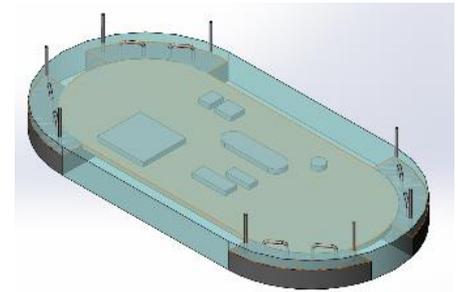
# Integration Platform: The Missing ~~Puzzle Piece~~ Table

- ▶ Developing modular, open HW/SW platform for e-textile sensing & actuating
  - Digital “smart patch” interfaces sensors & smart fabrics
- ▶ Decouple sensor, garment, uplink & backend design
  - Standardized interfaces
  - Open-source components
  - Fast path from prototype-to-field
  - Focus on innovation, not plumbing
- ▶ Have most of the end-to-end pieces from wearable node to backend
  - Plug & play from garment to host, cloud backend
  - Specific supports for data analysis and haptic cueing (including HWIL)
- ▶ Seeking to increase TRL
- ▶ Seeking partners & end users
  - Sensors, Smart Fabrics
  - E-Textile, Garment design, manufacturing

# CorBus: Modular, plug-n-play platform for wearables



- ▶ Simple 4-wire (power/data) bus protocol & xcvr
  - Plug & Play – addressable sensors & actuators
  - Designed for chip-scale microcontrollers and “lousy” e-textiles
  - Plain C interface stack
  - Arduino-compatible
- ▶ “Smart Patch” interfaces custom innovations
  - Standard interface from custom application to mixed-use e-textile bus
  - Miniature, flex/stretch, waterproof
  - Compatible with cut-and-sew garment workflows
  - “Smart yarn” feel with COTS components that exist now
- ▶ Minimized “wiring” -> optimize for comfort
- ▶ Low volume customization
- ▶ Supports multi-source innovation
  - Focus on individual strengths, not soloing everything



# Components and TRL Status



	Sensors	Node Interface	E-Textile	Uplink	Host	Cloud Backend
TRL	~	TRL6	TRL9	TRL5	TRL9	TRL9
Avail.	BYO COTS	FRAND	BYO (any)	FOSS	FOSS	Free/Sub scription

# Powered by CorBus: Haptic Alerting and Cueing

- ▶ Problem: Unobtrusive hazard alert and spatial cueing
  - Degraded visuals, High noise and vibration cockpit environment
- ▶ Approach: Smart haptic vest system
  - Intuitive spatial cueing for DVE, path following, and alerts
  - Mixed sensor/actuator bus
    - Realtime sense & tune to punch through aircraft vibration
    - Minimized wiring/weight
  - Arbitrary # of actuators (current vest has 52)
  - Software: Realtime cueing from avionic bus data, TCP/UDP hosts, etc.



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